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ABSTRACT

The Florida Community College Inter-Institutional Research Council (IRC) has developed a computerized budget simulation model which can help administrators determine the general fiscal impact of alternate approaches to resource utilization. This model uses three basic systems and one generalized subroutine, based on the budget requirements of the Division of Community Colleges of the Florida Department of Education. The first system generates a listing of expenses in instructional program areas, including advanced and professional, occupational, developmental and community instructional services. The second operates on support systems, including community service, academic support, student support, institutional support, and plant operation and maintenance. The third combines the output of the first two systems with revenue data to generate a statement of the ending fund balance. The subroutine uses base line data on salaries to produce budget year salary data for the instructional and support systems of the model. Although extensive input loading is required for each area of operation, most factors in the loading are required for any budget, and once the loading is complete only a few factors are changed at any time. The model produces good program budgets, or can be used in conjunction with the line item budget to assure eventual balance. (Author/NHM)

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A BUDGET SIMULATION MODEL FOR TIMES OF STRESS

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Florida public higher education has faced more than its share of instant budget decisions in 1974-75. The program reductions and 3.3% cuts in state funds caused by the loss of state revenue created a series of conditions requiring budget and operating adjustments. Producing 1975-76 budgets under the cloud of drastic fund reductions followed close on the heels of the original shock. To compound the problem, the divergence of the anticipated funding levels was very pronounced as budget preparation got underway and alternate budget approaches became necessary.

Higher education was hard put to produce the many viable options necessary under such conditions. The effect of any adjustment had to be traced through the total system to determine the magnitude of the outcome in both educational and monetary impact. In some cases, the conditions used in the adjustment would change during the analytical process and the labor would have been in vain.

The Florida Community College Inter-Institutional Research Council (IRC) has developed a budget simulation model which can aid in the study of the effect of any anticipated change. Although the model was created as a computative device to produce program budgets, top management of colleges are utilizing the model to determine the general fiscal impact of alternate approaches to resource utilization. The model has effected a very real saving in time and thus money. A budget run now is done in minutes whereas each

JC 760 221

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hand operated run involved several days. Accuracy is insured within the parameters of the model and the time involved in laborious hand checking is eliminated.

The Division of Community Colleges of the Florida Department of Education now requires a set of program budgets each year. This set of budgets includes three years of base line data; four separate budget years budgets; and budgets for each of five out years. For the 1976-77 year budget documents, full cost data for 1973-74, tentative cost data for 1974-75, and operating budget data for 1975-76 form the base or historical information. (Appendix A). The 1975-76 data are considered operating year data. One budget for the budget year is produced to indicate expenditures if all programs are allowed to operate under optimum conditions. No balance is required in this budget. However, the remaining three budgets must be balanced or at least produce a positive ending fund balance. These budgets are constructed on 100%, 95%, and 90% of the anticipated state funding level. Out year budgets are expected to be balanced.

The budgets and base information are divided into two broad areas. A primary or instructional area includes advanced and professional, occupational, developmental, and community instructional services as subprograms. Further, the occupational subprogram is divided into seven separate types of occupational instruction. The secondary or support area includes community service, academic support, student support, institutional support and plant operation and maintenance as subprograms.

The budget requires that expenditures in the instructional area be provided as both gross expenditures and expenditures per the student credit hour produced in each of the subprograms. The secondary expenditure is

provided as gross expenditure and as expenditure per total student credit hour.

A resource requirements projection, a part of the total budget package, requires a further breakdown. (Appendix B). In these resource documents, expenditures are further subdivided into four personnel categories, supplies and services, and equipment. The four personnel categories are instructional; executive, administrative or managerial; other professional; and support. The personnel categories also require a statement of full-time equivalent positions in each category and in each subprogram. These resource requirements projections must, of course, balance with the appropriate budgets. The resource requirement documents are required for the operating year and the budget year.

The author developed a logic and flow which incorporated the requirements of the resources and budget demands of the program budget system. IRC has provided FORTRAN programs and subprograms and documentation for operation of the model. The program is now in operation at a number of IRC member colleges.

The model was developed using the following guidelines:

1. The model should use available and generally accepted input data.
2. The model should be limited to the area of program budgets.
3. The program for the model should be simple in nature and run on almost any community college computer.
4. The model should provide for growth in application by the use of sub-routines.
5. The model should provide for operation at multiple levels of program aggregation.

The model utilizes three basic systems with one generalized sub-routine. The first system is designed to generate a listing of the expenses in the primary or instructional programs. The second system operates on the secondary or support programs. The third system combines the output of the first two systems with revenue data to generate a statement of the ending fund balance. The sub-routine uses base line data on salary to produce budget year salary data for the instructional and support systems of the model.

Each system in both primary and secondary areas is iterative. This allows for budget detail at any level of aggregation desired. The model can be run at the advanced and professional, occupation, developmental and community instructional service level in the primary programs or at any level of detail within these programs. Cost centers, departments or disciplines within the major primary programs can form the basic level. The model will then calculate the necessary budget data for the chosen level and accumulate the data on the subprogram level. The expenditures of all primary subprograms are then summed to provide total primary expenditure data. The same principles hold true for support programs. These areas may be run at any level below the five major subprograms and have expenditure data accumulated at the level of the major subprogram. The secondary programs are summed to produce total secondary or support expenditure data. These two major area expenditures are then combined with revenues to provide the ending fund balance data.

Initial input uses basic data and is again repetitive in nature. For each level of primary operation the following input is required:

1. Student credit hours
2. Productivity ratio (number of student credit hours produced by one full-time equivalent teacher)

3. Number of full-time instructional positions provided
4. Average full-time instructional pay for the operating year
5. Average full-time instructional pay increment
6. Average full-time instructional pay raise
7. Average full-time instructional retirement and other benefits
8. Average instructional part-time salary on an FTE basis
9. Average part-time instructional pay raise
10. Average part-time instructional retirement and other benefits
11. Administrative ratio (number of instructional positions needed to produce one administrative position)
12. Support ratio (number of instructional positions needed to produce one support position)
13. Supplies ratios (dollars spent on supplies for each of the total FTE positions)
14. Equipment ratio (dollars spent on equipment for each of the total FTE positions)
15. Items 3 through 10 must be repeated for administrative and support personnel

The program allows for the use of optional input. If the actual numbers of administrators and support personnel are input, these numbers will replace the numbers produced by the ratios. If the anticipated expenditures for supplies and equipment are input, these amounts will replace the acounts produced by the ratios. Ratios for supplies and equipment utilize total FTE positions to generate cost data, whereas ratios for personnel use instructional FTE positions.

Secondary or support program loading is basically the same as far as salary is concerned. However, no personnel or productivity ratios are used in the support programs. Anticipated numbers of personnel must be used. Again,

the override effect holds for equipment and supplies. Either ratios using total FTE position or numbers of dollars may be used for the supplies and equipment expenditure data with number of dollars overriding ratios.

Revenue input consists of state, federal, student and other sources. A beginning fund balance is also required.

The initial loading of the model may seem excessive. However, most factors in the loading are required for any budget and once the loading is complete only a few factors are changed at any time. In fact, the analysis required to produce the initial loading can provide insight into the operations of the institution and have an impact on management decision making.

Output in the primary areas gives total full-time equivalent positions; part-time positions; instructional salary expenditures by full-time, part-time and total positions for instructional, administrative and support categories. (Appendix C). The supplies and equipment expenditures are also produced. The total expenditures by level and subprogram completes the output of the primary subprograms. Secondary program output is similar, with the personnel expenditures being grouped in administrative, other professional and services categories. (Appendix D). Final output produces an ending fund balance which is either positive or negative. (Appendix E). The negative balance indicates excessive expenditures over the sum of the previous fund balance and revenue from all sources. A feature of the program provides the productivity ratio needed in each primary subprogram in turn in order to overcome a negative fund balance.

In multiple year budget calculations, each budget run will form the basic input into the salary section of the next year's run.

Use of the model has shown the model to operate in two modes. The use of actual data instead of ratios seems advisable in simulating budget year data. However, the ratios seem to have greater value as the budget extends

into out years. A basic problem with the ratio approach is the lack of any standards. Institutional data do not provide enough information about the points at which additional administrators or service personnel must be added. Statewide data obtained by the use of the model by IRC member colleges could provide insight into this staffing problem.

As with any model, the end product should be used with care. The model is not the real system in operation, only a mathematical representation. The results of each run should be examined and tested for reasonableness and adjustment made as needed.

The fact that the product is only a model does not impair its usefulness. The fact that it is only a model seems to increase the usefulness in some cases. A college can give a zero percent raise in the model and examine the results of such a move without the strife normally accompanying such neglect. Teacher loads (productivity ratio) can be manipulated without outcry. The brilliant idea that is sure to bring that desired budget balance can be tried in a very few minutes and the computer does not mind the endless calculation if the idea does not work. The model, however, does provide insight into the factors, or combination of factors, which produce the greatest changes in the financial picture of the institution. The model can also provide some concept of the relative impact on the budget of these factors.

If the model is loaded with budget year data, the effects of changes introduced during the year can be tested. Viable options can be introduced into the model and the various results examined. The model will not provide the answers to the problems, only the magnitude of the financial adjustment produced by each alternate. Management must still make those painful decisions, but data which will form part of the background of those decisions is

now readily available for each alternate considered.

The model can be used in conjunction with the line item budget to establish the broad parameters needed to assure balance in line item budget. If the model is run at the cost center level, problems within the line item budget will surface quickly. Thus, problems can be solved as the budget is constructed with some assurance of eventual balance.

The model also works well in its originally constructed role. It does produce good program budgets. They accurately reflect the input and require very little time to produce once the basic data is provided. The repetitive nature of the data and program operation provide for ready advance into the total series of required program budgets.

With the understanding of factor impact on the budget gained by use of the model, the mangitude and sign of the fund balance can provide clues as to possible alternate solutions to institutional problems.

The broad usage of the model could provide insight into some problems not directly related to budgets. Ratios, both personnel, and supplies and equipment, could be examined. The productivity ratio as a function of program and method of instruction needs further examination and the model could help. The full-time and part-time combinations of employment stand out in the model. What needs to be examined in this area? There also exist almost endless possibilities of examination for expenditure interaction both within the two broad areas and between these areas.

Further usage of the model and the imagination of the user can produce insights not yet apparent. Until that time, the Budget Simulation Model does its job of producing program budgets and providing management with partial answers to those "what-if" questions.

APPENDIX A

PROGRAM BUDGET

College _____ Budget Year _____

	Base Year (1973-74)			Current Year (1974-75)			Operating Year (1975-76)			Budget Year (1976-77)		
	Unit Cost	Units	Total Cost	Unit Cost	Units	Total Cost	Unit Cost	Units	Total Cost	Unit Cost	Units	Total Cost
1.1 Advanced & Professional												
1.2 Occupational (Total)												
1.21 Agriculture												
1.22 Distributive												
1.23 Health												
1.24 Home Economics												
1.25 Office												
1.26 Trade and Industrial												
1.27 Technical												
1.3 Development												
1.41 Citizenship												
Total Instruction 1.0												
3.0 Public Service												
4.0 Academic Support												
5.0 Student Support												
6.0 Institutional Support												
7.0 Plant Operation & Maintenance												
Total Services & Support												
TOTAL COSTS												

Revenues	Amount	%	Amount	%	Amount	%	Amount	%
State								
Student								
Federal								
Other								
TOTAL REVENUE		100		100		100		100
Ending Fund Balance								

APPENDIX B

PROGRAM BUDGET
Resource Requirements Projection

Operating Year 1975-76

Resource Categories	Advanced and Professional		Occupational		Developmental		Community Instructional Service		Public Service	
	FTE	Expenditures	FTE	Expenditures	FTE	Expenditures	FTE	Expenditures	FTE	Expenditures
Personnel:										
Instructional										
Exec., Admin, Mgr.										
Other Professional										
Support										
Supplies and Services										
Equipment										
TOTAL EXPENDITURES										

Resource Categories	Academic Support		Student Support		Institutional Support		Plant Operation and Maintenance		Total	
	FTE	Expenditures	FTE	Expenditures	FTE	Expenditures	FTE	Expenditures	FTE	Expenditure
Personnel:										
Instructional										
Exec., Admin, Mgr.										
Other Professional										
Support										
Supplies and Services										
Equipment										
TOTAL EXPENDITURES										

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